NAME ______________________ CLASS ______________ DATE ______________

24-2 Approximating Irrational Square Roots

UNIT 6

OBJECTIVE: *Finding a decimal approximation to a square root that is not rational*

If a rational number is not a perfect square, then its square roots are irrational numbers. You can approximate the roots by finding rational number approximations.

Two integers are consecutive if they differ by 1. The integers 7 and 8 are consecutive. The integers 7 and 9 are not.

EXAMPLE 1 **Find two consecutive integers between which $\sqrt{52}$ lies.**

Solution

Note that $7^2 = 49$ and $8^2 = 64$. Since $49 < 52 < 64$, $\sqrt{52}$ is between 7 and 8.

Using trial and error, you can find a decimal approximation to a square root.

EXAMPLE 2 **Approximate $\sqrt{52}$ to the nearest tenth.**

Solution

Since $\sqrt{52}$ is closer to 7 than it is to 8, test 7.2 and 7.3.

$$7.2^2 = 51.84 \qquad 7.3^2 = 53.29$$

So, $\sqrt{52}$ is between 7.2 and 7.3.

Since $\sqrt{52}$ is closer to 7.2 than it is to 7.3, test 7.21 and 7.22.

$$7.21^2 = 51.9841 \qquad 7.22^2 = 52.1284$$

Since 7.21^2 is closer to 52 than 7.22^2 is, $\sqrt{52}$ is closer to 7.21 than it is to 7.22.

To the nearest tenth, $\sqrt{52}$ is about 7.2.

Approximate each square root to the nearest tenth. First find two consecutive integers between which the square root lies, as in Example 1, and then calculate an approximation, as in Example 2.

1. $\sqrt{2}$ ________ **2.** $\sqrt{3}$ ________ **3.** $\sqrt{7}$ ________ **4.** $\sqrt{11}$ ________

5. $\sqrt{10}$ ________ **6.** $\sqrt{15}$ ________ **7.** $\sqrt{30}$ ________ **8.** $\sqrt{83}$ ________

9. $\sqrt{120}$ ________ **10.** $\sqrt{163}$ ________ **11.** $\sqrt{269}$ ________ **12.** $\sqrt{399}$ ________